NOTICE:

1. This contains all the questions from **2014 – 2017 sorted out by topic**
2. Topic is chosen according to **'Edexcel AS Biology' and 'Edexcel A2 Biology' by Ann Fullick**
3. I did not include questions relating to experiments as they could be found in my other videos for unit 3 and 6
4. I did not include 'describe' questions.
5. I also skipped several questions from Jan and June 2014 because they were repeated in the already mentioned questions
6. I will mainly focus on the long questions
7. I also skipped the questions related to the scientific paper.
8. Make sure you have done all your past papers before consulting this as it is purely for revision.
9. This will help your revision for **Unit 5**
10. **Lastly GOOD LUCK!!!**

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TOPIC 1 – LIFESTYLE, HEALTH AND RISK

1. **THE HEART AND HEALTH**

TOPIC 3 – THE VOICE OF THE GENOME

1. **EXPRESSING THE GENOME**

TOPIC 5 – ON THE WILD SIDE

1. **HOW ECOSYSTEM WORK – BIOTIC FACTORS**

TOPIC 6 - INFECTION, IMMUNITY AND FORENSICS

1. **PROTEIN SYNTHESIS**

TOPIC 7 – RUN FOR YOUR LIFE

1. **CELLULAR RESPIRATION – THE ENERGY SUPPLY**
2. **MUSCLES AND MOVEMENT**
3. **THE HEART, ENERGY AND EXERCISE**
4. **HEALTH, EXERCISE AND SPORT**

TOPIC 8 – GREY MATTER

1. **SENSITIVITY IN PLANTS**
2. **HOW THE NERVOUS SYSTEM WORKS**
3. **BRAINS AND BEHAVIOUR**
4. **BRAINS, THE GENOME AND MEDICINE**

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TOPIC 1 – LIFESTYLE, HEALTH AND RISK

1. THE HEART AND HEALTH

1) Explain why hypertension is a health risk. (Jan 2017)
   a) Leads to atherosclerosis
   b) Blood clotting or blockage of arteries
   c) This leads to heart attack or stroke
2) Suggest how lack of oxygen in heart muscle cells can cause angina. (Jan 2015)
   a) Lactate or lactic acid produced
   b) Stimulates pain receptors

TOPIC 3 – THE VOICE OF THE GENOME

1. EXPRESSING THE GENOME

1) Explain why two healthy parents can produce a child with Krabbe disease. (Recessive Allele Causes Disease) (Jan 2017)
   a) Both parents are heterozygous
   b) Child inherits one recessive allele from each parent hence become homozygous recessive

TOPIC 5 – ON THE WILD SIDE

1. HOW ECOSYSTEM WORK – BIOTIC FACTORS

1) Suggest two biotic factors that could affect the production of morphine by poppy plants grown in fields. (June 2017)
   a) Pests
   b) Disease
   c) Competition
   d) Pollinating insects

TOPIC 6 - INFECTION, IMMUNITY AND FORENSICS

1. PROTEIN SYNTHESIS

1) Krabbe disease is an inherited condition caused by a mutation of the *GALC* gene. The neurones in people with Krabbe disease gradually lose their myelin sheaths.

   Galactosylceramidase is an enzyme involved in maintaining the myelin sheath in neurones.

   The dominant allele of the *GALC* gene is involved in the synthesis of galactosylceramidase. (Jan 2017)

   a) Describe how the *GALC* gene is transcribed in the synthesis of galactosylceramidase. (Jan 2017)
      i) DNA strands separate
      ii) Mononucleotides line up against their complementary bases
      iii) On the template strand of DNA
      iv) Phosphodiester bonds form between adjacent mononucleotides)
      v) RNA polymerase
      vi) mRNA produced

TOPIC 7 – RUN FOR YOUR LIFE

1. CELLULAR RESPIRATION – THE ENERGY SUPPLY

1) Describe the roles of glycolysis and the Krebs cycle in the synthesis of ATP. (June 2017)
   a) Glycolysis
      i) Produces phosphorylated compounds
      ii) Substrate-level phosphorylation of ADP
      iii) Produces reduced NAD

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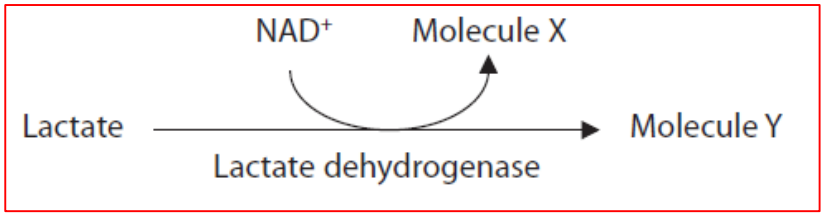
b) Krebs:
   i) Produces reduced NAD and reduced FAD
   ii) Reduced coenzymes supply electrons to ETC
   iii) Substrate-level phosphorylation of ADP
   iv) In the process of oxidative phosphorylation
   v) ATP synthase

2) Prolonged exposure to cold temperatures causes hypothermia. Hypothermia lowers the core body temperature which reduces the rate of metabolic processes, such as chemiosmosis, in cells. Explain how hypothermia reduces the synthesis of ATP by chemiosmosis. (June 2017)
   a) Reduction in activity of enzymes
   b) Hypothermia affects active transport of protons
   c) To intermembrane space
   d) Chemiosmosis requires a concentration gradient
   e) Hypothermia reduces diffusion down this gradient so less energy released by movement of protons
   f) Through ATP synthase
3) Explain how chemiosmosis and the production of ATP will be affected if the Krebs cycle is inhibited. (Jan 2017)
   a) No or reduced chemiosmosis
   b) Less production of reduced NAD
   c) Less active transport of hydrogen ions
   d) Fewer H+ in intermembrane space
   e) Less steep electrochemical gradient
   f) Less diffusion of H+ across ATP synthase
   g) The production of ATP will be reduced
4) Explain why increased oxygen delivery to muscle tissue enables athletes to work harder for a longer time. (Jan 2017)
   a) Aerobic respiration used to supply ATP
   b) ATP needed for muscle contraction
   c) Oxygen used as electron acceptor
   d) ADP combines with Pi
   e) Less anaerobic respiration so less lactate
   f) Lactate lowers pH and affects enzymes
   g) Less lactate means exercise can continue for longer
5) Explain the change in blood lactate concentration with an increasing level of exercise in the non-athlete. (Jan 2016)
   a) Insufficient oxygen supply
   b) Only Glycolysis Occurs
   c) Reduced NAD is produced
   d) Pyruvate is converted to lactate
   e) Conversion of pyruvate involves oxidation of reduced NAD
6) 

(Jan 2016)
   a) Name molecule X. (Jan 2016)
      i) NADH
   b) Describe what happens to molecule Y. (Jan 2016)
      i) Molecule Y is pyruvate

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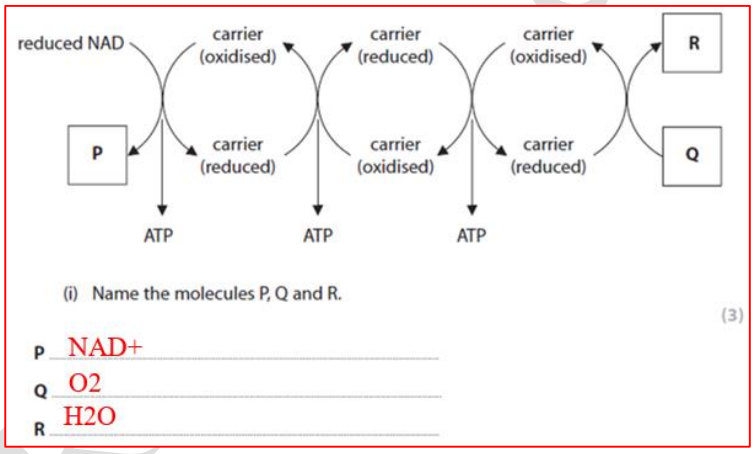
ii) Converted to acetyl CoA
iii) Converted to glucose

7) An increase in the width of mitochondria increases the surface area of membranes inside mitochondria. Explain how an increase in the surface area of these membranes will affect the synthesis of ATP in the muscle tissue of an athlete. (Jan 2016)
   a) Increased area of Cristae
   b) Oxidative phosphorylation happened in cristae
   c) Electron transport chain
   d) Electrons passed along carriers
   e) Hydrogen ions moved to intermembrane space
   f) Electrochemical gradient produced
   g) Chemiosmosis
   h) More ATP synthesised
8) Explain the effect that a high temperature has on chemiosmosis. (June 2015)
   a) Less ATP produced
   b) Because of denaturation of ATPase
   c) Less hydrogen ion transport
9) Describe how heart muscle cells make ATP when less oxygen is available. (Jan 2015)
   a) Anaerobic respiration
   b) Glycolysis
   c) Glucose is phosphorylated
   d) Reduced NAD is produced
   e) Formation of pyruvate
   f) Net gain of 2 ATP molecules per glucose molecule
   g) Need to regenerate oxidised NAD
   h) Pyruvate converted to lactate
10) 

(Jan 2015)
11) Suggest how inhibiting cytochrome oxidase would kill an elephant. (Jan 2015)
   a) Reduced carrier cannot be oxidised and oxygen cannot be used as electron acceptor
   b) Transport of electrons prevented or ETC stops
   c) ATP not made
   d) Oxidative phosphorylation
   e) ATP only from glycolysis
   f) Respiratory muscles cannot contract

2. MUSCLES AND MOVEMENT

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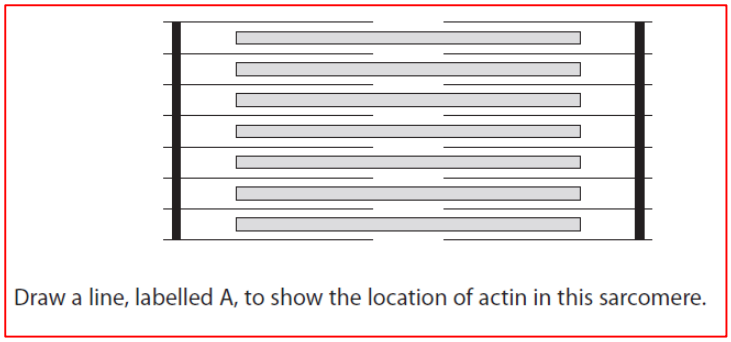
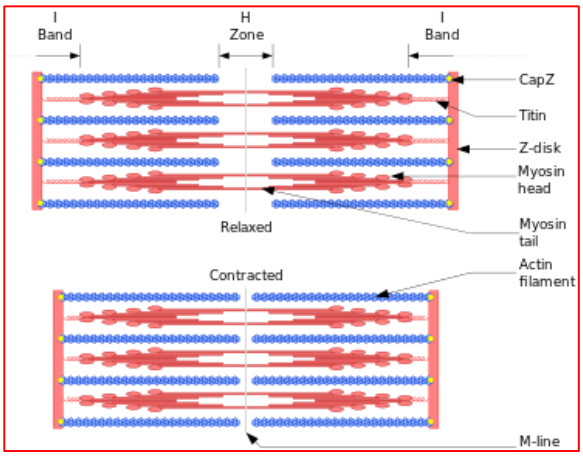
1) 

(June 2017)

a) 

2) Name **two** structural proteins present in a sarcomere, other than actin, that have a role in muscle contraction. (June 2017)
   a) Myosin
   b) Troponin
   c) Tropomyosin
3) The transcription of genes involved in making fast twitch and slow twitch muscle fibres is affected during six months in space. The mean percentage of slow twitch muscle fibres is reduced by 15%. Explain how this reduction affects the ability of astronauts to carry out exercise. (June 2017)
   a) Astronauts fatigue quickly
   b) Less aerobic and more anaerobic respiration
   c) Less ATP produced
   d) Fewer mitochondria
   e) Lactic acid produced
4) Explain why the muscle composition of a cheetah causes it to stop running if it fails to catch its prey within 50 m. (June 2016)
   a) Muscles have more fast twitch fibres
   b) Fewer capillaries and less myoglobin
   c) Less oxygen supply
   d) Less aerobic respiration and more anaerobic respiration
   e) Fewer mitochondria
   f) Lactate produced
5) Explain why tendons need to be inelastic. (Jan 2014)
   a) Tendons attach muscle to bone
   b) Do not stretch when muscle contracts so bone is moved

3. THE HEART, ENERGY AND EXERCISE

INCLUDES

3.1. CONTROLLING THE HEART

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1) Nicotine increases heart rate by stimulating adrenaline secretion from cells in the adrenal gland. The sequence of events leading to this adrenaline secretion involves a similar sequence of events that lead to the release of neurotransmitters at a synapse. Use this information and your own knowledge to suggest how nicotine stimulates an increase in heart rate. (June 2017)
   a) Nicotine attaches to receptors on cells of the adrenal gland
   b) Depolarisation of cell membrane
   c) Calcium ion channels open
   d) Influx of calcium ions
   e) Vesicles move to adrenal cell membrane
   f) Adrenaline is released into blood
   g) Adrenaline travels to the heart
   h) Increased activity of the SAN
2) Describe how the heart rate can be increased by nervous control during exercise. (June 2016)
   a) Change in CO2
   b) Detected by chemoreceptors in the aortic body
   c) Impulses sent to the medulla
   d) Sympathetic nervous system stimulated
   e) SAN stimulated
3) Give **one** similarity and **one** difference between hormonal and nervous control of the heart rate. (June 2016)

Hormonal	Nervous control
Both affect the SAN	
Slower	Faster
Last longer	Shorter
Chemical	Electrical

4) Explain what is meant by the term **electrocardiogram**. (Jan 2014)
   a) It shows waves and heart rhythm
   b) These are waves of electrical activity in the heart
   c) Over a period of time or during cardiac cycle

3.2. BREATHING RHYTHMS

1) The air the student exhaled passed through the carbon dioxide absorber in the spirometer. Name a carbon dioxide absorber. (Jan 2015)
   a) Soda Lime
2) Explain why the spirometer trace would be different if the carbon dioxide had not been absorbed. (Jan 2015)
   a) No downward slope
   b) Exhaled carbon dioxide equals consumed oxygen
3) Explain how carbon dioxide is involved in the control of breathing rate during exercise. (Jan 2015)
   a) Carbon dioxide increase in blood
   b) Fall in blood pH
   c) Chemoreceptors detect this
   d) Located in Medulla, carotid bodies and aortic bodies
   e) Impulses sent to ventilation centre
   f) Impulses sent from ventilation centre to intercostal muscles and diaphragm
   g) Increased breathing rate and depth of breathing
4) Morphine reduces the sensitivity of the brain to the concentration of carbon dioxide in the blood. This affects breathing rate and can cause death. Suggest why a high dose of morphine can cause death. (June 2017)
   a) Carbon dioxide is not removed from blood and level in blood increases

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b) Carbonic acid increases and pH decreases
c) Change not detected by chemoreceptors
d) Medulla is not stimulated
e) Fewer impulses to muscles involved in breathing
f) No contractions causes death

5) Ventilation of the lungs is controlled by homeostatic mechanisms.

Six students carried out an investigation to compare the longest time they could hold their breath at rest, after exercise and after breathing in and out deeply three times.

The table below shows the mean results with standard deviations from the investigation.

Student	Longest time student was able to hold breath / s		
	At rest	After exercise	After deep breathing
1	45	16	60
2	52	7	69
3	40	12	65
4	45	4	64
5	50	20	72
6	43	17	63
Mean and standard deviation	45.8 ± 3.7	12.7 ± 5.6	65.5 ± 3.9

(Jan 2017)

a) Use your knowledge of the control of ventilation to explain these results. (Jan 2017)
i) Less able to hold breath after exercise compared to deep breathing
ii) Exercise increases CO2
iii) Deep breathing reduces CO2
iv) Change in pH due to formation of carbonic acid
v) Detected by chemoreceptors in medulla
vi) Impulses sent for the contraction of diaphragm and intercostal muscles

6) The formula below shows Fick's law.

$$\text{rate of diffusion} = \frac{\text{area of diffusion surface} \times \text{difference in concentration}}{\text{thickness of surface over which diffusion takes place}}$$

Use the information in the formula to explain how the rate of diffusion is affected by asthma.

(Jan 2016)

a) Rate of diffusion reduced
b) Concentration gradient is reduced
c) Smaller surface area of aveoli

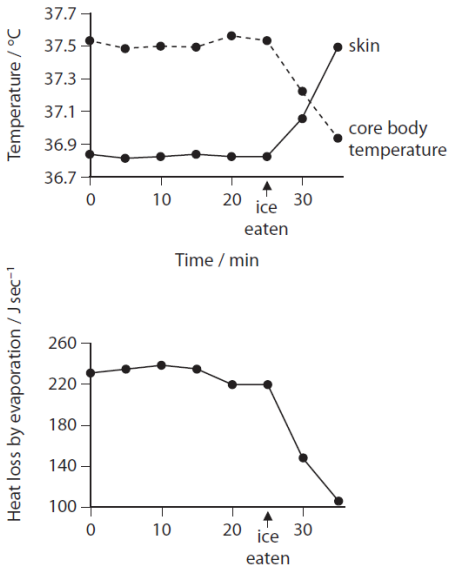
7) Explain how the atmosphere near a volcano (High CO2 level) can lead to an increase in breathing rate. (Jan 2014)
a) Concentration of carbon dioxide in the alveoli is higher
b) Concentration of carbon dioxide in the blood is higher
c) pH of blood falls due to increased CO2
d) CO2 and pH levels in blood detected by chemoreceptors in carotid body
e) Ventilation centre

f) Control is in medulla sends more impulses along neurones to intercostals muscles and diaphragm

8) Suggest how an increase in breathing rate can help to reduce the concentration of carbon dioxide in a person walking away from a volcano. (Jan 2014)
   a) Inhaled air has a lower CO2
   b) The CO2 concentration in blood is higher than in the alveoli so CO2 moving down concentration gradient
   c) CO2 lost to atmosphere through exhaling
9) Explain how a spirometer trace can be used to calculate the mean resting breathing rate of a person. (Jan 2014)
   a) One breath is peak to peak or trough to trough
   b) Count the number of peaks or troughs in a set time
   c) Number per minute
   d) Repetition to obtain a mean or improve reliability

3.3. HUMAN TEMPERATURE REGULATION

1) The graphs below show the results of this investigation.



   a) Explain the change in heat loss by evaporation after eating the ice. (June 2017)
      i) Heat loss decreases after eating ice
      ii) Ice reduces core body temperature
      iii) Reduced temperature detected by hypothalamus
      iv) Nerve impulses from hypothalamus to sweat glands
      v) Sweat glands inhibited
      vi) Less evaporation of water
      vii) Latent heat of vaporisation
2) Suggest how drinking hot coffee can cause a change in the production of sweat. (Jan 2016)
   a) Core temperature increases
   b) Hypothalamus send impulses to sweat glands
3) Suggest how the wood mouse maintains a constant body temperature when in a cold environment. (June 2015)
   a) Receptors in the skin and hypothalamus
   b) Nerve impulses to hypothalamus
   c) Arterioles constrict so less blood to superficial capillaries
   d) Shunt vessels dilate so less blood to superficial capillaries
   e) Hair erector muscles contract to trap air

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f) Less heat loss by radiation
g) Heat generated by shivering
h) Less sweating
i) Less heat loss by evaporation

4. HEALTH, EXERCISE AND SPORT

1) Suggest an explanation for the difference between the blood lactate concentration of the athlete and the non-athlete. (Jan 2016)
   a) Increased oxygen supply so more aerobic respiration
   b) Increased stroke volume
   c) Increased ventilation gas exchange
2) Give **two** advantages of using keyhole surgery to repair torn ligaments compared with other types of surgery. (Jan 2016)
   a) Procedure is less invasive
   b) Less pain after operation
   c) Faster healing
   d) There will be less scarring
   e) Reduced risk of infection
3) State the effect of exercise on each of the following. (Jan 2015)
   a) The risk of having diabetes and being obese. (Jan 2015)
      i) Exercise decreases the risk
   b) The immune system. (Jan 2015)
      i) Low intensity reduces immunity
      ii) Moderate intensity increases immunity
      iii) High intensity reduces immunity

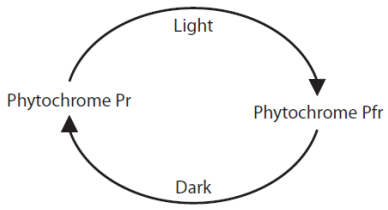
TOPIC 8 – GREY MATTER

1. SENSITIVITY IN PLANTS

Plants detect light using photoreceptors.

Phytochrome is a photoreceptor molecule found in plants.

The diagram below shows how two forms of phytochrome (Pr and Pfr) are affected by light.



Phytochrome Pfr reduces the levels of auxin (IAA) in the cells of plant shoots.

1)
   a) Use this information, and the diagram, to explain why plant shoots grown in the dark are taller than plant shoots grown in the light. (June 2017)
      i) Darkness converts Pfr to Pr
      ii) Light converts Pr to Pfr
      iii) More Pr and less Pfr in dark
      iv) More IAA present in the dark
      v) IAA softens cell walls
      vi) Uptake of water by osmosis
      vii) Causes cell elongation
2) Some insecticides also inhibit the synthesis of IAA (auxin) in plants. Suggest how this inhibition affects these plants. (Jan 2017)
   a) Less growth

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b) Less cell elongation

2. HOW THE NERVOUS SYSTEM WORKS

1)

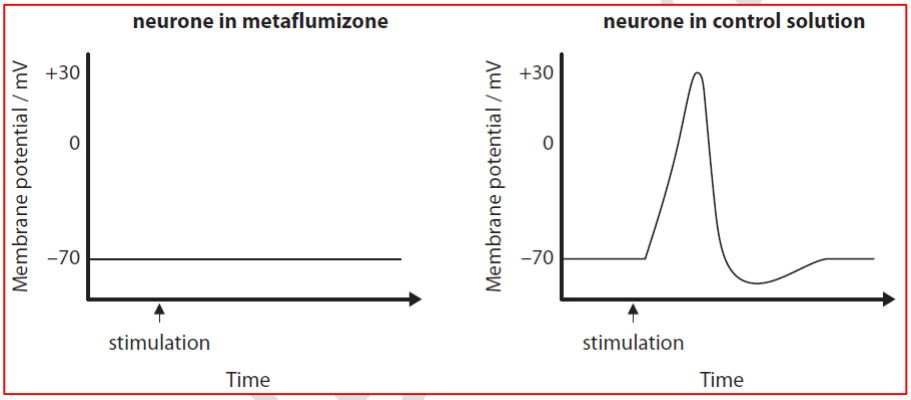
Ion	Concentration of ions / mmol dm^{-3}	
	inside axon	outside axon
potassium	400	30
sodium	50	460
organic anions	370	0

(June 2017)

a) Explain how the distribution of the ions is maintained (June 2017)
   i) Active transport
   ii) Sodium ions move out of cell and potassium ions move into cell
   iii) Membrane is permeable to potassium ions
   iv) Membrane is not permeable to sodium ions
   v) Membrane is not permeable to organic anions

2) Describe how the resting potential is maintained in a neurone. (Jan 2017)
   a) Sodium ions moved out of axon AND potassium ions move into axon by active transport use of ATP
   b) Potassium ions diffuse out down concentration gradient
   c) Sodium ions cannot diffuse back into axon

3)



(June 2017)

a) Using the information in the graphs, suggest how metaflumizone makes ants immobile. (June 2017)
   i) Metaflumizone closes sodium ion channels
   ii) No influx of sodium ions
   iii) No depolarisation
   iv) No stimulation of muscles

b) Some Argentine ants are resistant to metaflumizone. Suggest how these ants become resistant to metaflumizone. (June 2017)
   i) Mutation in the DNA
   ii) Different protein produced
   iii) Presence of enzyme that breaks down metaflumizone
   iv) Metaflumizone no longer blocks channel

4) This anaesthetic drug works by binding to channel proteins in the axons of neurones. These neurones normally transmit impulses that the brain interprets as pain. Explain how this anaesthetic drug prevents the patient feeling pain. (June 2016)
   a) Sodium ion channels
   b) Less influx of sodium ions into neurone
   c) There is less depolarisation

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d) There are fewer action potentials generated
e) Fewer impulses to brain

5) A different anaesthetic drug works by binding to calcium ion channels when an impulse arrives at a synapse. Suggest how this anaesthetic drug reduces pain. (June 2016)
   a) Calcium ion channels blocked
   b) Fewer calcium ions enter presynaptic knob
   c) Vesicles do not fuse with presynaptic membrane
   d) Less neurotransmitter release
   e) Reduced binding to receptors on the postsynaptic membrane
   f) Reduced depolarisation impulses to brain
6) Describe the events that take place at the synapse that enable transmission of a nerve impulse. (June 2015)
   a) Impulse of depolarisation arrives
   b) Calcium ion channels open and Calcium ions enter causing vesicles to fuse with presynaptic membrane
   c) Neurotransmitter released into synaptic cleft by exocytosis
   d) Diffusion of neurotransmitter
   e) Neurotransmitter binds to receptors in post synaptic membrane
   f) Sodium ion channels open and sodium ions enter
   g) Post synaptic membrane is depolarised and action potential
7) The skin of this frog produces a poison that affects sodium ion channels in the axon membrane of a neurone. The poison causes these channels to stay open. Explain the effect the poison has on the ability of a neurone to transmit impulses. (Jan 2015)
   a) Impulses cannot be transmitted so action potentials not possible
   b) Sodium ions move into axon
   c) Down a concentration gradient
   d) Neurone is depolarised
   e) Depolarisation is permanent
   f) Resting potential cannot be re-established
8) Suggest how constant impulses along motor neurones cause cramps. (Jan 2015)
   a) The release of calcium ions
   b) Calcium ions from sarcoplasmic reticulum
   c) Continued stimulation means high concentration of calcium ions remain
   d) Calcium ions bind to troponin
   e) Tropomyosin involved in muscle contraction
9) Suggest reasons why the second stimulus had no effect on the changes in the potential difference. (Jan 2014)
   a) Second stimulus is occurring during the action potential
   b) The neurone has not reached the resting potential
   c) Sodium ion channels closed
10) Explain what is meant by the term **neurotransmitter**. (Jan 2014)
   a) It comes from pre-synaptic neurone e.g. from vesicles that bind to pre-synaptic membrane
   b) It diffuses across the synaptic gap
   c) It affects post-synaptic neurone
11) Explain why myelination affects the conduction velocity of a nerve impulse along an axon. (June 2014)
   a) Schwann cells cover the axon
   b) Myelin provide insulation
   c) Action potential at nodes of Ranvier
   d) Local currents occur over a longer distance
   e) Saltatory conduction

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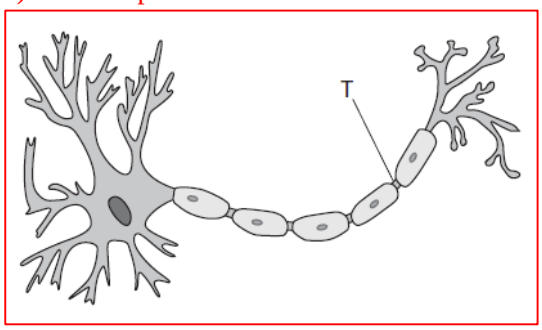
f) Impulse jumps from node to node

12) Acetylcholine is broken down by the enzyme acetylcholinesterase. Sarin is a chemical that inhibits this enzyme. Suggest the effect that sarin has on the transmission of nerve impulses. (June 2014)
   a) Acetylcholine not broken down
   b) Acetylcholine binds to receptor in post-synaptic membrane
   c) Sodium ions move into post- synaptic neurone, depolarisation of post-synaptic membrane
   d) Action potentials continue

13) 

(Jan 2015)
   a) Explain how the structure of this motor neurone affects the speed of the impulse along the axon. (Jan 2015)
      i) Myelination
      ii) Saltatory conduction → impulse jumps from node to node
      iii) This increases speed of the impulse

14) Explain how bright light shone into the eye is detected by cells in the retina leading to nerve impulses being sent to the brain. (June 2016)
   a) Photoreceptor cells
   b) Rhodopsin conversion into retinal and opsin and conversion of cis-retinal to trans-retinal
   c) Sodium channels close and sodium ions cannot enter
   d) Hyperpolarisation
   e) Reduced release of glutamate (neurotransmitter)
   f) Depolarisation of bipolar cell
   g) Action potential in sensory neurone

15) Describe what happens to the visual pigment in a rod cell when stimulated by light. (Jan 2014)
   a) Rhodopsin splits into opsin and trans-retinal
   b) A change in shape of cis-retinal into transretinal

16) Explain how the size of the pupil is changed when the eye is exposed to dim light. (June 2014)
   a) Radial muscles of iris contract
   b) Circular muscles of iris relax
   c) Pupil increases and dilates

17) Explain why people who absorb high concentrations of these insecticides have pupils with a small diameter. (Jan 2017)
   a) Circular muscles contract
   b) Radial muscles relax

3. BRAINS AND BEHAVIOUR

1) Explain how fMRI scanning could be used to investigate if habituation occurs when the same sound is used. (Jan 2017) (June 2015)
   a) fMRI scan shows activity of auditory cortex
   b) fMRI measures uptake of oxygen
   c) Active area of brain gets more blood and oxygen
   d) Oxyhaemoglobin and deoxyhaemoglobin involved
   e) More active area appears light
   f) If habituation occurs then brain activity falls with repeated stimulus

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2)

Symptom	Part of brain affected
loss of vision	Occipital Lobe
difficulty in walking	Cerebellum

(June 2016)

3)

Statement	Method of scanning		
	MRI	CT	fMRI
Uses X-rays	×	✓	×
Allows observation of the brain in action	×	×	✓
Provides images in soft tissue without contrast medium	✓	✓	✓

(June 2015)

4) Suggest the advantages of using MRI scanning to identify tumours, compared with using CT scanning. (June 2014)
   a) Better resolution
   b) More detail seen e.g. smaller parts seen, finer detail
   c) No use of X rays
   d) Safer e.g. less risk of cell damage, mutation therefore can use more often
5) Distinguish between nature and nurture. (June 2017)
   a) Nature involves genes
   b) Nurture involves environment
6) Explain what is meant by the term **habituation**. (June 2016)
   a) Reduced response to a stimulus repeated
   b) Habituation is a form of learning
7) Explain the advantage of habituation to the sea slug living in rough water. (June 2015)
   a) Stimulus is harmless
   b) Less withdrawal of siphon saves energy and allows gas exchange

4. BRAINS, THE GENOME AND MEDICINE

1) Explain how an imbalance of the brain chemical serotonin can contribute to ill health. (June 2017)
   a) Serotonin is a neurotransmitter
   b) Low levels of serotonin linked to depression
2) A serotonin selective reabsorption inhibitor (SSRI) may be given to patients to reduce depression. Suggest how this helps to reduce depression. (Jan 2014)
   a) Serotonin not reabsorbed OR SSRI binds to reuptake proteins
   b) Synapse
   c) There is a high level of serotonin
   d) Serotonin continues to have an effect e.g. serotonin continues to bind to receptors in post-synaptic membrane
3) It is thought that nicotine stimulates the release of the neurotransmitter involved with Parkinson's disease. Suggest how this might reduce the symptoms of Parkinson's disease. (June 2017)
   a) Neurotransmitter is dopamine
   b) Binding to receptors in postsynaptic membrane
   c) Depolarisation of postsynaptic membrane

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   d) Generation of action potentials
4) Cocaine is a drug that inhibits the uptake of dopamine by the presynaptic neurone. Suggest how cocaine can help a person to have an increased sense of pleasure. (June 2015)
   a) Cocaine binds to the re-uptake channel
   b) Dopamine remains in synaptic cleft
   c) Dopamine binds to receptors in postsynaptic membrane
   d) Depolarisation in postsynaptic neurone
5) Explain what is meant by the term **transcription factor**. (Jan 2014)
   a) Protein that regulates and binds to promoter region for mRNA synthesis
6) Scientists have genetically modified yeast cells to produce pyrethrin. Suggest how yeast cells could be genetically modified to produce pyrethrin. (Jan 2017)
   a) Gene for pyrethrin synthesis removed from flowers
   b) Using restriction enzyme
   c) Use of vector
   d) Use of DNA ligase for joining gene to plasmid
   e) Culturing yeast cells to produce pyrethrin
7) Describe how cells could be genetically modified to produce these new drugs. (June 2016)
   a) Restriction enzyme
   b) Gene for the drug
   c) Vector such as liposome
8) Suggest how this gene is removed from the red coral cells and then added to the zebrafish genome. (Jan 2014)
   a) Restriction enzyme
   b) Gene is removed from DNA
   c) Vector is needed e.g. virus used / (micro) pipette injection, gene gun, microprojectile, liposome, plasmid
   d) Gene incorporated into DNA of zebrafish
9) Suggest **one** potential risk to other organisms in a river ecosystem if a genetically modified zebrafish escaped into this river. (Jan 2014)
   a) Effect on native populations of zebrafish e.g. transfer of added gene, competition, reduction of population

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